DEVICE CONTROL USING GAZE INFORMATION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional App Ser. No. 62/739,087, entitled "DEVICE CONTROL USING GAZE INFORMATION", filed on Sep. 28, 2018, the content of which is hereby incorporated by reference in its entirety.

FIELD

[0002] The present disclosure relates generally to computer user interfaces, and more specifically to techniques for controlling electronic devices using gaze information.

BACKGROUND

[0003] Users frequently provide inputs, such as key presses and voice inputs, to control electronic devices. For example, users activate a device's button or speak a trigger phrase to start an application on the device. Such inputs frequently require the user to be within arm's reach or within microphone range.

[0004] Intelligent automated assistants (or digital assistants) can provide a beneficial interface between human users and electronic devices. Such assistants can allow users to interact with devices or systems using natural language in spoken and/or text forms. For example, a user can provide a speech input containing a user request to a digital assistant operating on an electronic device. The digital assistant can interpret the user's intent from the speech input, operationalize the user's intent into a task, and perform the task. In some systems, performing tasks in this manner may be constrained in the manner by which a task is identified. In some cases, however, a user may be limited to a particular set of commands such that the user cannot readily instruct a digital assistant to perform a task using natural-language speech inputs. Further, in many instances digital assistants fail to adapt based on previous user behavior and in turn lack a desirable optimization of user experience.

BRIEF SUMMARY

[0005] Some techniques for controlling electronic devices, however, are generally cumbersome and inefficient. For example, some existing techniques use a complex and time-consuming user interface, which may include multiple key presses or keystrokes. For another example, some existing techniques require the user to be within arm's distance to activate a button of the device. Existing techniques require more time than necessary, wasting user time and device energy. This latter consideration is particularly important in battery-operated devices.

[0006] Accordingly, the present technique provides electronic devices with faster, more efficient methods and interfaces for controlling electronic devices. Such methods and interfaces optionally complement or replace other methods for controlling electronic devices. Such methods and interfaces reduce the cognitive burden on a user and produce a more efficient human-machine interface. For battery-operated computing devices, such methods and interfaces conserve power and increase the time between battery charges. Such techniques also allow users to more efficiently interact with electronic devices in environments where the user is not within reaching distance of the electronic device and/or the user is in a noisy environment (e.g., including noise based on audio being produced by the electronic device).

[0007] In accordance with some embodiments, a method is provided. The method is performed at an electronic device. The method comprises: while a digital assistant of the electronic device is not activated: obtaining, using one or more camera sensors, first gaze information; and in accordance with a determination that the first gaze information satisfies a set of one or more activation criteria: activating the digital assistant of the electronic device; and providing an indication that the set of one or more activation criteria has been satisfied.

[0008] In accordance with some embodiments, a non-transitory computer-readable storage medium is provided. The medium stores one or more programs configured to be executed by one or more processors of an electronic device. The one or more programs including instructions for: while a digital assistant of the electronic device is not activated: obtaining, using one or more camera sensors, first gaze information; and in accordance with a determination that the first gaze information satisfies a set of one or more activation criteria: activating the digital assistant of the electronic device; and providing an indication that the set of one or more activation criteria has been satisfied.

[0009] In accordance with some embodiments, a transitory computer-readable storage medium is provided. The medium stores one or more programs configured to be executed by one or more processors of an electronic device. The one or more programs including instructions for: while a digital assistant of the electronic device is not activated: obtaining, using one or more camera sensors, first gaze information; and in accordance with a determination that the first gaze information satisfies a set of one or more activation criteria: activating the digital assistant of the electronic device; and providing an indication that the set of one or more activation criteria has been satisfied.

[0010] In accordance with some embodiments, an electronic device is provided. The electronic device comprises: one or more processors; and memory storing one or more programs configured to be executed by the one or more processors, the one or more programs including instructions for: while a digital assistant of the electronic device is not activated: obtaining, using one or more camera sensors, first gaze information; and in accordance with a determination that the first gaze information satisfies a set of one or more activation criteria: activating the digital assistant of the electronic device; and providing an indication that the set of one or more activation criteria has been satisfied.

[0011] In accordance with some embodiments, an electronic device is provided. The electronic device comprises: means, while a digital assistant of the electronic device is not activated, for: obtaining, using one or more camera sensors, first gaze information; and means, in accordance with a determination that the first gaze information satisfies a set of one or more activation criteria, for: activating the digital assistant of the electronic device; and providing an indication that the set of one or more activation criteria has been satisfied.

[0012] In accordance with some embodiments, a method is provided. The method is performed at an electronic device. The method comprises: while a first external device is in a first state: receiving an audio user input request to perform a first command; and obtaining, using one or more